Batching and Mixing

Ingredient Storage

- *Ingredient storage*
  - Bulk ingredient storage bins should be properly labeled and inspected. Removal of foreign material by sending grain or corn through a screener prior to storage can help mitigate problems with grain storage.
  - Bagged ingredients should be stored in original packaging with lot numbers for traceability and identification of products.
    - Drugs in mixing areas should be properly identified, stored, handled, and controlled to maintain their integrity as defined in cGMP. This includes inventory of drug through reconciliation.
  - Liquid ingredients should be stored in original containers or liquid tanks and provided heat until use if specified by supplier.

Batching

- *Scale resolution*
  - **Deviations from specification should not exceed 1% for ingredients with greater than 5 lb inclusion and 2% for ingredients less than 5 lb.**
    - Under no circumstance should the overage or shortage of one ingredient be corrected when adding the next ingredient.
  - Review each batching report for ingredient discrepancy before shipment of complete feed to compare formulation and actual ingredient addition.
    - Each report should include time and date, formula name and number, ingredient names, ingredient lot numbers (if applicable), ingredient quantities, theoretical and actual weight of ingredients added, where feed was stored, and operator identification.
  - Records should be kept for 1 year after production, 2 years if medicated.
- *Order of ingredients*
  - The order of addition of ingredients into the mixer from bins, totes or hand-add stations is important to establish a uniform mix.
    - Order should be major ingredients (greater than 20%), minor (10 to 20%), micro (< 10%) inclusion and hand adds (< 1%).
    - Liquid ingredients should be sprayed on after the pre-determined dry mix time for dry ingredients.
    - The size of the batch of feed should never exceed the volume which the mixer is designed.

Mixing

- *Mixers*
  - Mixer ribbons and paddles should be inspected monthly to minimize build up from ingredient adhesion. Shaft, paddles, or ribbons should always be visible. Material buildup is a key indication that ribbons, and paddles are not functioning properly.
  - **Mixer uniformity CVs should be done annually, if not biannually.**
  - **The feed industry standard is a CV of less than 10%.**

Feed sequencing and flushing

- The most effective option is utilizing a complete cleanout procedure of the mixer.
- *Sequencing:*
  - Batch sequencing is the pre-defined succession of feed manufacturing to prevent contamination of subsequent batches to prevent unsafe contamination by drug or ingredient carryover.
  - To achieve minimal drug carryover, feeds with the same drug should be manufactured in sequence from highest to lowest inclusion.
  - When manufacturing feeds with drug inclusion, for integrated mills, manufacture the nursery diet likely containing the drug followed by sow, grower, then finisher feed. Cull sows should not be fed from this sequence.
  - For commercial mills, make sure that batches following the sequence are non-medicated feed of the same species.
  - When considering batch sequencing for pathogen control, manufacture feeds from highest to lowest risk, starting with multiplication units followed by sow farms, nursery, clean grow finish, then dirty grow finish.
- *Flushing:*
  - Flushing involves running an abrasive-type ingredient through manufacturing equipment to prevent unsafe contamination by drug carryover.
  - It is recommended to use flush size of 5 to 10% of the mixer's total capacity for normal mixing times.
  - Flush material can then be used as rework in future medicated diets of the same drug.
  - Bin or container should be labeled as flush rework including the flush ingredient, medication flush may contain, lot number, target animal.
    - Flush for medicated feed should be used in feed containing the same medication for the same species.